APPELLANTS' BRIEF AND APPENDICES

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
Marc Weydert, et al.	)	Confirmation No.: 2594
For: STARCH COMPOSITE REINFORCED	)	Docket No.: DN2002105
RUBBER COMPOSITION AND TIRE WITH	)	Art Unit: 1713
AT LEAST ONE COMPONENT THEREOF	)	Examiner: William K. Cheung
Serial No.: 10/603,023	)	**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**
Filed: June 24, 2003	)	

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

APPELLANTS' BRIEF

Dear Sir:

Appellants, by virtue of their Notice of Appeal filed December 27, 2005, hereby file this Brief in response to the Final Rejection of all pending claims in the above-identified application. Please charge my Deposit Account No. 07-1725 in the amount of Six Hundred Twenty and 00/100 Dollars ($620.00) to cover the fee for filing this Brief in support of this Appeal and a one-month extension of time. Any deficiency or overpayment should be charged to this Deposit Account.

Real Party in Interest

The real party in interest in the present application is The Goodyear Tire & Rubber Company.

Related Appeals and Interferences

Appellants are not aware of any appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending Appeal.

Status Of The Claims

Claims 1 through 12 and 16 stand rejected and are subject to this Appeal. A copy of

Claims 1 through 12 and 16 appear in the Claims Appendix of this Brief.

Status Of Amendments

No amendment after Final Rejection under 37 C.F.R. Section 1.116 was filed.

Summary Of The Claimed Subject Matter

The subject matter of the sole independent Claim 1 relates to a tire having a circumferential tread comprised of a rubber composition. (Page 10, Line 32 to Page 11, Line 2). The rubber composition comprises 100 parts by weight of at least one diene-based elastomer; from about 1 to about 60 phr of a starch/synthetic plasticizer composite; and from about 0.1 to about 10 phr of an adduct of maleic anhydride and polybutadiene. The starch/synthetic plasticizer composite may be composed of amylose units and amylopectin units in a ratio of about 15/85 to about 35/65, alternatively about 20/80 to about 30/70, and has a softening point according to ASTM No. D1228 in a range of about 180°C to about 220°C; and the starch/plasticizer has a softening point in a range of about 110°C to about 170°C according to ASTM No. D1228. (Page 4, Lines 22 through 31).

Grounds of Rejection to be Reviewed on Appeal

The first and only issue before the Board of Patent Appeals and Interferences is whether Claims 1 through 12 and 16 are properly rejected under 35 U.S.C. Section 103(a) as being unpatentable over Corvasce et al. (U.S. Patent No. 5,672,639; hereinafter "Corvasce") in view of Huynh-Tran et al. (U.S. Publication No. 2003/0152758, hereinafter "Huynh-Tran").

ARGUMENT

Claims 1 through 12 and 16 Rejected Under 35 U.S.C. Section 103(a)

The claims have been rejected under 35 U.S.C. Section 103(a) as being unpatentable over Corvasce et al. (U.S. Patent No. 5,672,639; hereinafter "Corvasce") in view of Huynh-Tran et al. (U.S. Publication No. 2003/0152758, hereinafter "Huynh-Tran").

Appellants urge that no motivation exists to combine the teachings of Corvasce and Huynh-Tran to arrive at the present claims, and therefore no *prima facie* obviousness has been established. Further, even if *prima facie* obviousness exists, the specification includes evidence of unexpected results sufficient to overcome *prima facie* obviousness.

To establish a *prima facie* case of obviousness, the PTO must satisfy three requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *See Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1385, 58 U.S.P.Q.2d 1286, 1293 (Fed. Cir. 2001); *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1352, 48 U.S.P.Q.2d 1225, 1232 (Fed. Cir. 1998). *Northern Telecom v. Datapoint Corp.*, 908 F.2d 931, 934, 15 U.S.P.Q.2d 1321, 1323 (Fed. Cir. 1990) ; *Abbott Laboratories v. Syntron Bioresearch, Inc.*, 334 F.3d 1343, 67 U.S.P.Q.2d 1337 (Fed. Cir.), *reh'g denied*, 2003 U.S. App. LEXIS 17605 (2003).

Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. In other words, a hindsight analysis is not allowed. *See Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1209, 18 U.S.P.Q.2d 1016, 1023 (Fed. Cir. 1991); *In re Erlich*, 3 U.S.P.Q.2d 1011, 1016 (Bd. Pat. App. & Int. 1986).

Lastly, the prior art reference or combination of references must teach or suggest all the limitations of the claims. *See In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

A *prima facie* case of obviousness may be refuted by a showing of unexpectedly superior results. *In re Soni*, 54 F.3d 746, 34 U.S.P.Q. 2d 1684 (Fed. Cir. 1995).

As noted by the Examiner (Office Action 7/01/05, paragraph 6), Corvasce teaches the

use of a starch/synthetic plasticizer composite filler in tire tread rubber compounds, however, Corvasce is silent regarding the use of an adduct of maleic anhydride and polybutadiene in the tread compound. Huynh-Tran is directed to improving the adhesion of a fiber reinforcement to rubber through use of a maleinized polybutadiene added to the rubber and/or to a coating on a fiber (abstract) and is silent regarding the use of maleinized polybutadiene in a tread compound. The Examiner finds motivation to incorporate the adduct of maleic anhydride and polybutadiene of Huynh-Tran into the rubber composition of Corvasce since "Huynh-Tran et al. have successfully exemplified incorporating a maleinized polybutadiene in a similar rubber composition with increased adhesion." (Office Action July 1, 2005, Paragraph 6). The Examiner further maintains in the Office Action mailed December 14, 2005, Paragraph 4, that "since there is no negative teaching in Corvasce et al. to teach one of ordinary skill in the art not to incorporate the maleinized polybutadiene teachings of Huynh-Tran into Corvasce et al., the motivation set forth in the office action of July 1, 2005 is proper because (sic)."

By contrast, the present claims are directed to a tire having a tread comprising a rubber composition comprising a starch/synthetic plasticizer composite filler and an adduct of maleic anhydride and polybutadiene. One skilled in the art would not be motivated to add a maleinized polybutadiene of Huynh-Tran to the rubber composition of Corvasce; nowhere does Huynh-Tran nor Corvasce teach nor suggest such a rubber composition or use of such a rubber composition as a tire tread. In fact, Corvasce teaches only to use a silane coupling agent with the starch/synthetic plasticizer composite filler in a tread compound (Examples I, II and III).

Appellants urge that the Examiner has failed to establish a *prima facie* case of obviousness, since no motivation exists to combine the teachings of Corvasce and Huynh-Tran to arrive at the present claims. As for the Examiner's asserted motivation that

"Huynh-Tran et al. have successfully exemplified incorporating a maleinized polybutadiene in a similar rubber composition with increased adhesion," Huynh-Tran teaches an epoxy-modified adhesion promotor useful to improve adhesion of polyester fibers to a rubber composition that may include maleinized polybutadiene (abstract). Thus while Huynh-Tran teaches use of a maleinized polybutadiene in a rubber composition, the use of that rubber composition to improve adhesion to a polyester fiber is clearly not the same as the present claims. Nowhere does Huynh-Tran teach nor suggest that such a rubber composition including maleinized polybutadiene may advantageously be used with a starch/synthetic plasticizer composite filler as taught by Corvasce. The Examiner has not established that a rubber composition that shows advantageous adhesion to an epoxy adhesive treated polyester fiber as in Huynh-Tran necessarily will show advantageous interaction with a starch/synthetic plasticizer composite filler as in the present claims. Nor does Corvasce teach nor suggest such a combination; in fact, to improve interaction between the starch/synthetic plasticizer composite and rubber composition Corvasce teaches only that a silane coupling agent may be used (Examples I, II, and III). Without more to establish the similarity of the polyester fiber as taught in Huynh-Tran to the starch/synthetic plasticizer composite filler as in the present claims, or the similarity of the adhesion to polyester fiber compared to the adhesion to a starch/synthetic plasticizer composite filler, the Examiner's proposed motivation for combining the teachings of Huynh-Tran and Corvasce ("Huynh-Tran et al. have successfully exemplified incorporating a maleinized polybutadiene in a similar rubber composition with increased adhesion") fails. One skilled in the art would have no expectation of success for such a combination; there is nothing in either Huynh-Tran or Corvasce to suggest that a maleinized polybutadiene may be successfully used with a starch/synthetic plasticizer composite filler in a tire tread as recited in the present claims. As no expectation of success for the proposed combination, no *prima facie* obviousness has been established. Instead, the

Examiner has engaged in impermissible hindsight reconstruction of the claims. "Hindsight is not a justifiable basis on which to find that ultimate achievement of a long sought and difficult scientific goal was obvious." *Amgen Inc. v. Chugai Pharm. Co.*, 927 F.2d at 1209, 18 U.S.P.Q.2d at 1023.

As for the Examiner's contention regarding the lack of negative teaching in Corvasce to incorporate the maleinized polybutadiene teachings of Huynh-Tran into Corvasce, Appellants are at a loss to understand this as a proper basis for finding obviousness. The law is clear that obviousness must be based on clear evidence of a suggestion or motivation to combine. "In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce the claimed invention." *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d at 1385, 58 U.S.P.Q.2d at 1293. A showing of a suggestion, teaching, or motivation to combine the prior art references is an "essential evidentiary component of an obviousness holding"). *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d at 1352, 48 U.S.P.Q.2d at 1232. In this case, rather than providing a positive suggestion, motivation, or teaching, the Examiner ostensibly suggests that since Corvasce does not explicitly say "don't put maleinized polybutadiene in the rubber," then Corvasce must suggest to one skilled in the art that he should put maleinized polybutadiene in the rubber. Appellants urge that this is clearly not a proper motivation, suggestion or teaching to combine the references, and no *prima facie* obviousness exists.

Moreover, Appellants urge that even if *prima facie* obviousness is found to exist, the present specification includes evidence of unexpected results to obviate any finding of obviousness. Corvasce teaches that the performance of a starch/synthetic plasticizer composite filler in a tread compound is improved through the use of a silane coupling agent in combination with the starch/synthetic plasticizer composite filler (Examples I, II, and III).

By contrast and as taught at Page 24, Line 14, to Page 25, Line 9, in the present specification the data of Table 7 indicate that, for loss modulus measured at 50°C, a much wider range of values for G" exists for starch/synthetic plasticizer composite filler and rubber compositions having the maleic anhydride/polybutadiene adduct than for starch/synthetic plasticizer composite filler and rubber compositions having silane. The Dispergrader data in Table 6 indicate that the filler dispersion in the maleic anhydride/polybutadiene adduct concentration range of 3 phr to 7.5 phr (Samples 9 through 12; a higher value of white surface area indicates poorer dispersion) was approximately equivalent to the filler dispersion in the silane concentration range of 3 phr to 5 phr (Samples 14 through 16). For these approximately equivalent levels of filler dispersion, the variation in G" with maleic anhydride/polybutadiene adduct concentration (from about 0.028 to about 0.05) was much greater than that for the silane (from about 0.03 to about 0.036). Such a wide variation in G" allows compound design to achieve a compromises between properties such as tear resistance and damping characteristics with the maleic anhydride/polybutadiene adduct that are not possible with the silane. One skilled in the art would have no expectation of such behavior, based on the teaching of Corvasce regarding the use of the silane, nor based on the teaching of Huynh-Tran regarding the maleinized polybutadiene (specification at Page 25, Lines 4 through 9).

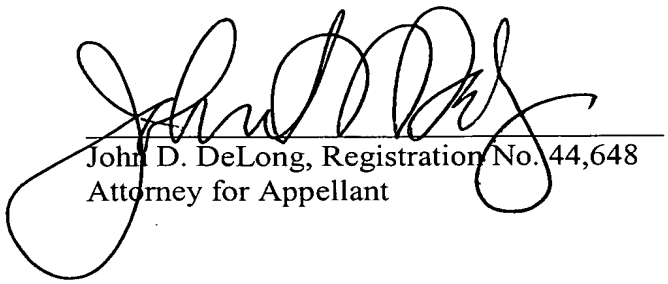
Table 7 also shows a comparison of the loss moduli at -10°C for samples containing maleic anhydride/polybutadiene adduct or silane. The loss modulus G" at -10°C for the silane compositions (Samples 14 through 16) was approximately constant over the strain range. By contrast, the loss modulus at -10°C for maleic anhydride/polybutadiene adduct compositions (Samples 8 through 13) was nonlinear over the strain range, similar to the unfilled composition (Sample 7). While not wishing to be bound by any theory, this behavior suggests that a core-shell interphase between the polymer matrix and the starch/plasticizer

composite filler exists and remains soft at low temperature, and as a consequence can induce higher loss properties than is possible with the silane. The behavior of the 100 and 300 percent modulus also supports the idea of a soft-core shell. For equivalent dispersion levels, the 100 and 300 percent moduli as shown in Table 6 are consistently lower for Samples 8 through 13 as compared with Samples 14 through 16. The lower stiffness at large strain may be attributable to the softer core shell with the adduct of maleic anhydride and polybutadiene, as compared to the silane. The tangent delta behavior at equal dispersion also supports the idea of a soft-core shell. Table 6 shows that equal dispersion was obtained for 3 phr of the adduct of maleic anhydride and polybutadiene (Sample 9) and for 3 phr of silane (Sample 14). However, tan delta at -10°C is much higher for Sample 9 (.194) as compared to Sample 14 (0.116), while the tan delta at 50°C is approximately equal for Samples 9 and 14 (0.028 and 0.025). This suggest that core-shell remains soft at low temperatures for compositions including the adduct of maleic anhydride and polybutadiene, possibly due to the lower Tg as compared with the silane.

The loss modulus, 100 and 300 percent moduli, and tan delta behavior of Samples 8 through 13 as compared to the silane samples 14 through16 is highly surprising and unexpected. As noted, this behavior indicates that the physical properties of the rubber composition may be tailored to provide a wider range of tear and hysteresis values than is possible with silane coupling agents. Other physical properties are equal or superior as compared with the silane. By contrast, Huynh-Tran teaches only the advantage of using maleinized polybutadiene on the adhesion of rubber compounds to reinforcing fiber or cord. One skilled in the art would clearly not expect, based on Huynh-Tran or Corvasce, the behavior in the present invention. Applicants urge that the evidence of unexpected results as presented in the specification as filed is sufficient to overcome *prima facie* obviousness of the claims. *In re Soni* , 54 F.3d 746, 34 U.S.P.Q. 2d 1684 (Fed. Cir. 1995).

Based upon the foregoing, Appellants respectfully request reconsideration of the pending claims and earnestly solicits a reversal of the Examiner's rejection.

Respectfully submitted,



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CLAIMS APPENDIX

WHAT IS CLAIMED IS:

1. A tire having a tread comprised of a vulcanizable rubber composition comprising:

(A) 100 parts by weight of at least one diene-based elastomer wherein selected from the group consisting of natural or synthetic cis 1,4-polyisoprene rubber, 3,4-polyisoprene rubber, styrene/butadiene copolymer rubbers, isoprene/butadiene copolymer rubbers, styrene/isoprene copolymer rubbers, styrene/isoprene/butadiene terpolymer rubbers, cis 1,4-polybutadiene rubber and medium to high vinyl polybutadiene rubber having a vinyl 1,2- content in a range of about 15 to about 85 percent and emulsion polymerization prepared butadiene/acrylonitrile copolymers;

(B) from about 1 to about 60 phr of a starch/synthetic plasticizer composite; and

(C) from about 0.1 to about 10 phr of an adduct of maleic anhydride and polybutadiene.

2. The tire of claim 1, wherein said adduct of maleic anhydride and polybutadiene has a number average molecular weight of from about 1,500 to about 10,000.

3. The tire of claim 1, wherein said adduct of maleic anhydride and polybutadiene has a number average molecular weight of from about 2,500 to about 7,500.

4. The tire of claim 1, wherein said adduct of maleic anhydride and polybutadiene has an average of from about 2 to about 20 functional groups based on maleic anhydride per polymer chain.

5. The tire of claim 1, wherein said adduct of maleic anhydride and polybutadiene has an average of from about 3 to about 12 functional groups based on maleic anhydride per polymer chain.

6. The tire of claim 1, wherein said adduct of maleic anhydride and polybutadiene is present in a range of from about 0.4 to about 8 phr.

7. The tire of claim 1, wherein said starch/synthetic plasticizer composite comprises starch composed of amylose units and amylopectin units in a ratio of about 15/85 to about 35/65, and has a softening point according to ASTM No. D1228 in a range of about 180°C to about 220°C, provided that said starch/plasticizer composite has a softening point in a range of about 110 to about 160°C according to ASTM No. D1228.

8. The tire of claim 1, wherein said starch/synthetic plasticizer composite comprises a plasticizer that is a liquid at 23°C and is selected from at least one of poly(ethylenevinyl alcohol), cellulose acetate and plasticizers based, at least in part, upon diesters of dibasic organic acids and forms said starch/plasticizer composite having a softening point in a range of about 110 to about 160°C when combined with said starch in a weight ratio in a range of about 1/1 to about 3/1.

9. The tire of claim 1 wherein said starch/synthetic plasticizer composite comprises a plasticizer having a softening point of less than the said starch and less than 160°C and is selected from at least one of poly(ethylenevinyl alcohol), cellulose acetate and copolymers, and hydrolyzed copolymers, of ethylene-vinyl acetate copolymers having a vinyl acetate molar content of from about 5 to about 90, alternatively about 20 to about 70, percent, ethylene-glycidal acrylate copolymers and ethylene-maleic anhydride copolymers.

10. The tire of claim 1, wherein said at least one diene elastomer is selected from the group consisting of homopolymers of isoprene and 1,3-butadiene and

copolymers of isoprene and/or 1,3-butadiene with a aromatic vinyl compound selected from at least one of styrene and alphamethylstyrene.

11. The tire of claim 1, further comprising from about 20 to about 85 phr of carbon black.

12. The tire of claim 1, further comprising from about 10 to about 85 phr of silica.

13. (Cancelled)

14. (Cancelled)

15. (Cancelled)

16. The tire of claim 1, wherein said adduct of maleic anhydride and polybutadiene has a glass transition temperature in a range of from about -70°C to about 0°C.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.